

and vol. 2-Process Integration: pp. 331, 431, 434-5. Applicant respectfully traverses the rejection as follows.

The Examiner has indicated that Wolf discloses processing temperature, pressure and reactive and inert gases. Although, operational characteristics are listed in Wolf, Applicant respectfully submits that the listing of operational parameters of typical systems has no bearing on the novelty of the present invention.

Claim 1 sets forth a method including "introducing a reactive gas into said internal environment of said process chamber with said reactive gas at a first molecular ratio relative to a molecular content of said internal environment; adjusting said first molecular ratio to a second molecular ratio; and unloading the semiconductor wafer from said process chamber at said steady-state processing temperature and while said internal environment is at said second molecular ratio." Applicant could find no teaching or suggestion in Wolf that discloses operating a process chamber in such a method.

The present invention includes the unloading a semiconductor wafer from a process chamber at the same steady-state temperature as experienced during processing. In most processing applications, the processing temperature is reduced from processing temperature in order to stop the processing reactions from occurring.

In Claim 1, the method includes adjusting the molecular ratio of the reactive gas relative to the molecular volume of the internal environment. Accordingly, no variation in the steady-state temperature of the process chamber is required to cause processing to cease, thus allowing wafers to be removed from the process chamber.

Although, Wolf provides disclosure regarding wafer processing in general, the Examiner has failed to point out where Wolf teaches, suggests or motivates one skilled in the art to arrive at a method such as that set forth in Claim 1. Although, Applicant has amended Claim 1, it has been done only to clarify the method of the present invention and not to narrow Claim 1 in view of Wolf. Accordingly, Claim 1 is allowable over the cited references.

Claims 11 and 14 set forth a method including introducing a process gas at a first partial pressure into the process chamber and adjusting or varying the first partial pressure to a second partial pressure, followed by removal of the wafers while the process gas is at the second partial pressure. Again, Claims 11 and 14 have been amended only to further clarify the present invention and not to narrow the claims in view of Wolf.

For reasons similar to those mentioned with regard to Claim 1, Applicant could find no teaching or suggestion in Wolf, nor has the Examiner pointed to any disclosure that

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anticipates the method set forth in Claims 11 and 14. Accordingly, Claims 11 and 14 are allowable over the cited references.

Claims 2-10 depend from Claim 1 and are therefore allowable for at least the same reasons as Claim 1. Claims 12 and 13 depend from Claim 11 and are therefore allowable for at least the same reasons as Claim 11. Claims 15-21 depend from Claim 14 and are therefore allowable for at least the same reasons as Claim 14.

CONCLUSION

For the above reasons, pending Claims 1-21 are now in condition for allowance and allowance of the application is hereby solicited. If the Examiner has any questions or concerns, the Examiner is hereby requested to telephone Applicant's Attorney at (949) 752-7040.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231, on 7/3/02.

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ATTACHMENT A

1. (Amended) A method for forming a thin film on a semiconductor wafer comprising:
heating an internal environment of a process chamber to a steady-state processing temperature;
loading a semiconductor wafer into said internal environment of said process chamber;
introducing a reactive gas into said internal environment of said process chamber with said reactive gas at a first molecular ratio relative to a molecular content of said internal environment [preselected pressure];
adjusting said first molecular ratio to a second molecular ratio; and
unloading the semiconductor wafer from said process chamber at said steady -state processing temperature and while said internal environment is at said second molecular ratio.
2. (Amended) The method of Claim 1, wherein said steady-state processing temperature is between 800° C and 1200° C.
3. (Amended) The method of Claim 1, wherein said steady-state processing temperature is between 200° C and 800° C.
4. (Amended) The method of Claim 1, wherein said [introducing] adjusting of said first molecular ratio to said second molecular ratio comprises [reactive gas includes] introducing an inert gas into said internal environment, wherein said second molecular ratio between said reactive gas and said inert gas causes said reactive gas to be at [said] a preselected partial pressure.
5. (Amended) The method of Claim 4, wherein said preselected partial pressure of said reactive gas is between 0.1 Torr and 760 Torr.
7. (Amended) The method of Claim 1, wherein said preselected partial pressure of said reactive gas is between 0.1 Torr and 760 Torr.
8. (Amended) The method of Claim 1, wherein said preselected partial pressure comprises a partial pressure of said process chamber between about 0.1 Torr and 760 Torr.

10. (Amended) The method of Claim 1, [further comprising] wherein said adjusting includes introducing [diluting said reactive gas with] N₂ into said internal environment to reduce said first molecular ratio to said second molecular ratio [preselected pressure].

11. (Amended) A method of forming a thin film on a semiconductor wafer comprising:

heating a process chamber to a steady-state processing temperature;

loading a semiconductor wafer into a process chamber, said process chamber being under vacuum pressure;

introducing a process gas at [under] a first partial pressure into said process chamber; adjusting said first partial pressure to a second partial pressure; and

removing said semiconductor wafer from said process chamber while said process [chamber] gas is [under vacuum] at said second partial pressure.

13. (Amended) The method of Claim 12, wherein said loading and removing of a plurality of semiconductor wafers are accomplished using a robot arm comprising multiple end-effectors for grasping said plurality of semiconductor wafers.

14. (Amended) A method of forming a thin film on a semiconductor wafer comprising:

heating a process chamber to a steady-state temperature;

pulling a [vacuum] first pressure in said process chamber;

loading at least one semiconductor wafer into [a] said process chamber while said process chamber is at [under] said [vacuum] first pressure;

introducing a process gas [under] at a first partial pressure relative to said first pressure into said process chamber to allow processing of said at least one semiconductor wafer to commence;

varying said first partial pressure to a second partial pressure which allows said processing of said semiconductor wafer to cease; and

removing the at least one semiconductor wafer from said process chamber while said process chamber is at said second partial pressure.

15. (Amended) The method of Claim 14, wherein said steady-state temperature is a process temperature between about 800° C and 1200° C.

16. (Amended) The method of Claim 14, wherein said first [vacuum] pressure is maintained in the range of between 0.1 Torr and 760 Torr.

19. (Amended) The method of Claim 14, **[further comprising]** wherein said varying said first partial pressure to a second partial pressure comprises pulling a vacuum pressure within said process chamber [after said introducing of said process gas under pressure].

20. (Amended) The method of Claim 14, wherein said removing the at least one semiconductor wafer from said process chamber while said process chamber is at said second partial pressure is accomplished while said second partial pressure is substantially at [process chamber is under said] vacuum pressure.

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